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ABSTRACT

Although education technologies have had a substantial impact on curricula, teaching, and learning, the overall impact on education has been limited. Evaluative studies of technology in the classroom in California, England, and France, have shown that computers and other new education technologies were embraced initially as viable educational reforms, but lacked the sustained support necessary for their successful continuation. The governments proved to be catalysts for change as political entrepreneurs introduced and defined programs to win support, but costs, complexities, and the need for a strong, broad-based coalition to sustain change overwhelmed the technology revolution. The result has been a cycle of inadequate funding, lack of dissemination and program support, marginalization of the technology, and attenuation of public, professional, and political interest in the programs. The impact of education technologies has been more positive in the workplace, and it is possible that a substantial technological impact on educational achievement will result from policy and practice in the political-market model of innovation. (DB)

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EDUCATION AND TECHNOLOGY:

BUILDING A CONSENSUS FOR CHANGE

by

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The Seventh International Conference on Technology and Education, March 1990

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Education and Technology: Building a Consensus for Change

By Daniele Rodamar* and Jeffery W. Rodamar@

Ours is a paradoxical age in which information is more readily available outside the classroom than in it. While business and government have adopted new technologies, organization, and praxis, education remains much as it was over a century ago when Matthew Arnold, Jules Ferry and Horace Mann fought to establish universal schooling. Emerging technologies —such as computer assisted instruction and distance learning-have the potential to transform education, "providing an Aristotle to tutor each pupil", opening access, and controlling costs. But like the older technologies of radio and TV, they remain at the margins of education and may reinforce educational methods whose very existence is a reflection of the limits of the precomputer era. These technological options also reopen questions of who controls the classroom, of what local, national, and international materials are to be studied, and accountibility. Although some schools introduced computers and distance learning in the 1960s and 1970s, the major developments have occurred in the 1980s, since the advent of the microcomputer. The legislative system is the "gate-keeper" in education, often determining the initiation, pace, and scope of change. It authorizes activities, sets standards, funds, and enforces accountability. This paper examines legislative issues that have structured the educational use of technology during the past decade. US and European Community case studies show powerful similarities—as well as critical pressure points that affect the path and pace of innovation.

In three cases, governments launched major initiatives in response to available technology, international competition, and grassroots interest. Politicians found the issue useful to mark party differences, to break with former administrations, and to show commitment to modernity. By 1989, the computer was no longer a stranger in class: California had a computer for every 25 students; the US, one per 27; UK one per 32; France, one per 38. By the end of the decade, hit-or-miss bold initiatives had given way to details of evaluation, dissemination, interagency coordination, teacher participation, and private sector linkages. Government had been a catalyst for educational change, but costs, complexities, and the need for broad coalitions to sustain implementation overwhelmed efforts at revolution from above. In the EC and the US, the political deal was not double: initiatives were left, by default, to others. Let us look at US and EC case studies.

California, home of Silicon Valley, undertook what OECD termed "one of the largest and most innovative educational technology programs in the world". Concerned by a lack of innovation, the legislature enacted the "Educational Technological Local Assistance Program" in 1983 to fund pilot classroom projects at 13 schools, 17 regional Teacher Education and Computer Centers (TECC) and a central clearinghouse, instructional TV, and equipment (including a VCR for every school). The Technology in Curriculum Project developed and disseminated materials for integration of computer software and video into normal curricular objectives. Steps were taken to require computer competence as part of teacher certification. Funding for the program grew from $15 mn in 1983 to $26 mn by 1986. Caught in a larger clash between a Republican governor and an elected Democratic Superintendent of Public Schools, funding was cut (to $15 mn in 1988). Demonstration programs were cut back, all TECCs were closed, etc. The future of the program was unclear and despite the comprehensive nature of the program, California ranked 43rd in pupil/computer ratios and due to weak assessment the impact of the program on educational achievement remained unclear.

The state legislature recently gave new life to the program. The new legislation, which boosts spending (to roughly $0.06 per pupil), stresses rigorous information and evaluation systems and the integration of dissemination within existing systems. Software and cost information, and access to trainers will be provided over California State University's "CSU net". Local efforts (including 12 voluntary consortia of local education agencies), and

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joint ventures with businesses and nonprofit organizations augment and provide flexibility to state efforts. In brief, a comprehensive hit-or-miss initiative had a troubled existence, but provided foundations for more rigorous and sustained policy.

Many states, caught up in the fevor of the school reform movement stimulated by the 1983 A Nation At Risk report, initiated more modest changes. In 1981 few state education agencies were involved with education technology; by 1989 almost every state had created an administrative post to address this issue. While Federal education funding declined in real terms from 1981-87, the proportion of schools with one or more instructional computers grew from 18% to 95%. But quality software, training and support were often lacking. These initiatives by political entrepreneurs were often ad hoc, poorly integrated, and lacked in research, evaluation, and follow through.

Ronald Reagan was elected US president in 1980 pledged to dismantle the Federal government's role in education. Under his leadership, Federal funding for education fell in real terms and declined from about 9% to 6% of US educational expenditures. Vouchers, school discipline, tougher graduation requirements and less spending were among the Administration's themes. Since technology was cotly and could increase the Federal role, it had only a very minor role in Administration proposals. The U.S. Department of Education did not even have an inventory of funded projects involving computers until the mid-1980s.

Many education technology measures were introduced in the Democratically controlled Congress, but few saw action. The few enacted—such as the Kennedy "Star Schools" distance learning program and the Owens technology for the handicapped centers—had trouble winning funding. For example, the newly enacted Star Schools program was initially funded by taking fund from education block grants to the states in a Senate floor fight; it received no funding the following year. Ambiguities in Chapter I for education of the disadvantaged and other Federal education programs were exploited by local schools to purchase education technology. Limited use of such funds was explicitly allowed in the 1988 Hawkins-Stafford Act. But simply permitting the use of technology in existing programs did little to encourage it, to provide training and infrastructure, and led to jurisdictional problems (e.g. computers purchased with Chapter I funds could not be used for adult literacy education.

In sum, the US remained without a central program or institution to shape policy and drive political debate. Funding remained uncertain. The situation varied widely among the states. In the classroom, only about half of the teachers reported ever having used a computer—and the proportion using one regularly was far lower. The US remained far from having "an Apple on every desk" (or even on every teacher's desk.

The UK and France began initiatives during this period. To spur the use of technology in the decentralized UK system, in 1980 the newly elected Tory government created the Microelectronics Education Program (MEP) in the ministry of education to develop and distribute materials and to train teachers through regional resource centers. The BBC, in a series on computers, sought to build public familiarity with them. The ministry of industry, eager to cultivate a domestic electronics industry, provided various 50% subsidies to schools for purchase of UK made computers. Equipment remained scarce and underpowered and teacher training and support was often 'pragmatic' at best. In 1988, at the time of the Education Reform Act, MEP was reorganized as the "Information Technology in Schools Unit" to work closely with teacher organizations for evaluation of software and related materials. The National Education Resources Information System (es. 1986 by the ministry of industry) was reorganized as an independent trust to provide videotext information to teachers and others. In brief, often hit-or-miss initiatives by the central government in the early 1980s gave way to reorganizations and more carefully honed work.

In France too, education technology policies signaled a symbolic break with the past. For the Socialist government elected in 1981, education initiatives emphasizing decentralization of schooling and computer useage offered economic and political gains. To educate the general public, 400 centers with 2000 French made computers operated in 1983 during the vaction months to allow the public to have hands on contact with computers. Youth with computer science degrees were allowed to meet their national service requirements by training others to work with computers. The MINITEL system provided videotext access to education and other resources. In 1985 Socialist, Prime Minister Fabius launched a program of "Informatique Pour Tous" to increase the availability of computers in schools, emphasizing

access in all regions and building a critical mass of computers in selected schools. An extensive teacher training program provided a full year training course (in universities) for trainers, and twelve days of training in a local setting for other teachers. Subsequently, Prime Minister Chirac retained the emphasis on computers in schools but increased emphasis on evaluation and on private sector involvement. Plans do go astray: much of the spending for computers ended up strengthening university computer centers. And although over a quarter of teachers in France had received computer training by 1985, studies criticized the pedagogy and the lack of classroom focus in the training. A study reported that after training classroom use of comuters declined, equipment was underutilized, and teachers were disaffected. A 1986 evaluative study had shown that computers were not yet important tools in the classroom. In sum, the importance of grassroots input and implementation—even in a relatively centralized education system with political support for change—had become clear, and program changes reflected this.

The European Community, coming late to education issues, undertook major language education and international exchange programs as well as making progress on recognition of academic credentials in member countries in preparation for 1992. As in the US, no major education technology initiatives were undertaken.

Although education technologies have had a substantial impact on curricula, teaching, and learning, the overal impact on education has been limited to date. Evaluative studies of technology in the classroom (England 1987, France 1986, US 1985,1988, and 1989) have shown that computers and other new education technologies are not yet major tools in the classroom. Government could be a catalyst for change, but costs, complexities and the need for a broad coaltition to sustain change overwhelmed efforts at revolution from above. There is a vicious cycle at work here. Political entrepreneurs, working for change and hoping to mobilize support, have defined programs broadly to win support (e.g. "every school should have at least one computer). While this has allowed programs to be established, the programs have remained without a strong constituency: for business this is still a small market, for teachers it threatens to change working conditions and to take funds that could be used for textbooks and pay, for administrators it is a costly initiative with unclear payoffs that may require major reorganizations of schooling to be used effectively. As a result, the issue keeps threatening to slip to the back of the political agenda. The result is that inadequate funding spread so thinly that it has no big impact anywhere makes it hard to demonstrate performance. Unpopular funding for research, dissemination and support is slight and vulnerable to budget cuts. This encourages marginalization of this technology to reinforce current practice. Resulting lackluster performance, in turn, undermines public, professional, and political support for the program. This cycle creates "ghost technologies", as the interesting technological and instructional options fade before the institutional and political realities.

Whatever happens in the classroom, technology is transforming the workplace. Affluent families already have computers at home: their children have the huge advantage of familiarity when they encounter technology in the workplace. Increasing evidence also suggests these technologies can have substantial impacts on educational achievement. Access now falls along with family income. Inaction or inadequate policy will widen the gap; sustained effective policy to encourage use of education technology benefits both the student and the nation. Modern societies have rapid diffusion of knowledge, rapid change, and many centers of power. The commonalities in these case studies highlight that. Coalitions provide the basis for change. Here the State is most effective as an overseer, regulating independent and competing organizations and mobilizing support. This political-market model of innovation stresses the role of the state in spurring innovation and movement along the learning curve by setting standards, providing infrastrcture, funding vital activities, and mobilizing support for change. Pilot projects that show clear winners and losers and drive competition, as well as training to build constituencies can help drive the political agenda. And international organizations and conferences such as this are essential: they not only help identify what works, but they also stimulate informed cooperation and competition to drive innovation in education.